

THE CURE OF CRIPPLED CHILDREN.

PROPOSED NATIONAL SCHEME.

BY

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It is unfortunately the case that children suffering from crippling diseases and deformities of all kinds exist in large numbers throughout our country. The majority lie out of sight in their homes; many are in workhouses or collected in homes for crippled children, but many others are frequently to be met in our streets. The number of adult cripples resulting from disease or deformity in childhood is a still more common object for our sympathy; and shame is added when we realize that perhaps three-fourths of these could have been cured, and most of the others given much greater activity, if their condition had been recognized early and treated efficiently. There is no lack of sympathy for these children, but it must be led into practical channels, and, after all, the comparative comfort of a cripples' home is but a half-measure. Our sympathy should be directed towards the cure of the deformities and diseases from which they suffer, or, where cure is beyond reach, the greatest improvement that can be attained. This paper is written to draw attention to this need and to bring forward proposals for the establishment of a system of orthopaedic hospitals and clinics for the active treatment of cripples, and more particularly of crippled children, throughout the country. In Shropshire a system of hospital and out-patient treatment such as is here to be described has been organized, owing to the pioneer work of Miss Hunt, who started the Children's Orthopaedic Hospital at Baschurch in 1900. As a direct consequence many hundreds of children have been cured or greatly benefited. Further, through the out-patient clinics added more recently, many cases have been brought to light which would otherwise have remained unknown and untreated. Thus we have been able to realize more fully the great number of cases in very serious need of treatment.

The proposals put forward are thus not merely theoretical, but concern the multiplication of this organization throughout England and Wales, and its general co-ordination under the Ministry of Health.

The accompanying table is compiled from the list of cases under treatment in Shropshire, and at a daughter institution at Stoke in Staffordshire, and represents fairly the principal disabilities and the three main groups in which they may be included.

It will be seen that rickets and surgical tuberculosis taken together account for 40 per cent. of the crippled children under treatment in these areas. Of the causes of these diseases and of the means of preventing them we have practical knowledge. Rickets occurs almost exclusively in the children of the poorer sections of the population and surgical tuberculosis is commoner among them than among the well-to-do. Overcrowding and bad housing, with lack of open-air playgrounds and ventilation in the homes, are among the predisposing causes of both these diseases, coupled in the case of rickets with improper or insufficient food, and in that of surgical tuberculosis with tuberculous milk. Of the causes of the other groups too little is known to justify any sanguine anticipations that they can be greatly diminished in the near future. We are impotent to prevent congenital deformities and have little or no power to control the incidence of paralysis, though much may be done by suitable early treatment to prevent or later to rectify the deformities so produced. The table shows that cases under treatment for congenital deformities and paralysis constitute 45 per cent. of the total. In health organization directed towards the elimination of the causes of rickets and tuberculosis lies the best hope of any early reduction in the frequency of crippling disabilities. Even were this achieved and the present total of cripples diminished by 40 per cent., then would remain the other 50 or 60 per cent. crippled by causes over which we have little or no control.

Table of Cases under Treatment.

Nature.	Shropshire.	Stoke.	Total.
A. D. formities, congenital or acquired:			
Rickets	51	177	228
Deformities of the foot	51	71	122
Scoliosis	14	8	22
Congenital dislocation of hip	8	16	24
Fractures, non- and mal-union	10	15	25
Other deformities		43	43
Total	134	330	464
B. Paralysis:			
Infantile paralysis	72	211	283
Infantile hemiplegia	11	43	65
Spastic paraplegia	11		
Total	94	254	348
C. Surgical tuberculosis:			
Spine	75	55	230
Hip		57	
Knee		26	
Other joints, etc.		17	
Total	75	155	230
D. Other conditions:			
Osteomyelitis	11	33	44
Various	28	16	44
Total	39	49	88
Total	342	788	1,130
Approximate population of area served	246,307	425,000	671,307
Approximate proportion of cases under treatment to population	1 to 722	1 to 538	1 to 594

GENERAL CONSIDERATIONS AS TO TREATMENT.

Under present conditions some of these children die, and of the remainder most become cripples. Many are fully curable, almost all can be benefited; but an organization to provide early and well-directed treatment is necessary.

The country has, so far, made no real effort to face the problem. The great need for hospital provision for cases of surgical tuberculosis has indeed been recognized by Government under the National Insurance Act (1911), but no comprehensive scheme has been brought forward. Here and there orthopaedic hospitals, or orthopaedic departments of general hospitals, exist as a result of voluntary effort, but these are only capable of dealing with a small percentage of the cases. For the immense majority there is no hospital accommodation, nor can they hope for adequate treatment. The task is beyond the scope of the general hospitals, for it is impossible for them to provide the necessary conditions, which should include ample bed accommodation in open-air country hospitals. It is characteristic of orthopaedic surgery that an operation is often not an end in itself, but one link in a chain of treatment; moreover, by early treatment and progressive orthopaedic measures operation can in many cases be avoided altogether. Further, there is, as a rule, no period of natural convalescence, but, on the contrary, in the case of most deformities a persistent tendency to relapse long after complete correction. For these reasons a long stay in hospital with continued careful corrective treatment and after-supervision are necessary.

In those cases of paralysis in children where tendon grafting is needed, a carefully planned course of treatment preparatory to operation must be carried out and afterwards directed toward the restoration of function.

Again, the need for time is exemplified in the more chronic diseases of bones and joints, which may call for perfect immobilization and surgical care for very long periods.

A lengthy stay in hospital must therefore be foreseen and provided for. The average duration of in-patient treatment may be reckoned as six months or more, and the bed accommodation should be sufficient to allow this.

Further, there should be no fixed age limit, for adolescent and adult cripples needing active treatment must not be shut out, and a considerable number of accidental injuries occur which demand orthopaedic treatment.

Experience has proved the very great advantage of treating the children in open-air wards in the country. Not only is this most advisable on account of the actual benefit due to the country air, but also it is economically sound owing to the immensely higher price of alternative town sites.

Further, the final results, and the rapidity with which they can be obtained, depend to a very great extent on early recognition and treatment. For example, a congenital deformity which in early infancy can be cured by simple painless manipulation will, when the child is six months old, require forcible correction under anaesthesia, and at six years may need several such manipulations, and possibly operative interference as well, with in the end a less perfect result.

At present a paralysis or deformity is too often accepted by parents, and even by medical men, as permanent and incurable. This is due to the want of knowledge of parents and those responsible for the case of what can be done and of the importance of doing it early. Hitherto there have been very few orthopaedic hospitals in England; as a consequence, such children have been sent up to a busy general hospital, where, owing to pressure on the beds, it has not been possible to keep the patients in long enough; further, there has been no after-care organization, and the whole treatment has been nullified by the inevitable tendency to relapse.

PROPOSED SCHEME.

Our proposals concern:

- A. The division of England and Wales into a number of districts.
- B. The establishment in each district of
 - (1) An open-air country orthopaedic hospital.
 - (2) A system of scattered out-patient clinics.
- C. The organization of efficient treatment.
- D. General co-ordination by a committee working under the Ministry of Health.
- E. The number of beds required.
- F. Financial provision required.

A.—The Division of England and Wales into a Number of Districts.

This division should be coincident with that for other administrative purposes, and might well follow that adopted by the Ministry of Pensions. Where the Pensions "Regions" are too large they should be suitably subdivided. The districts should not be too large, as close interworking of hospital and clinic is necessary; wherever possible a radius of fifty miles should not be exceeded.

B.—The Establishment in Each District of

(i) An Open-air Country Orthopaedic Hospital.

These hospitals will be referred to as the *Central Orthopaedic Hospitals*. Each should provide bed accommodation adequate to serve the district, have open-air wards, be situated on dry soil with a good aspect, and be in the country, but preferably near enough to a town to share in its water, light, transport, and drainage systems.

In addition to the wards there will be needed operating theatres, gymnasias, handicraft workshops, schoolrooms, playrooms, and an administrative block. Most, if not all, of these requirements could be met by suitable huts.

As the patients will be mainly children of school age, it will be necessary for the education authorities to arrange for their schooling and to provide the requisite teachers.

Workshops where the children can learn simple handicrafts such as basket making, carpentering, and leather work, are of great value, and for the older children we hope that some definite training in suitable industries may be possible.

While cure of the disability is the prime object of the whole organization, we feel that the development of happiness, of a self-reliant outlook and the capacities of these children is of the utmost importance.

The hospitals should be centres of play, of handicrafts, and of education, as well as of treatment.

For management these hospitals should, if possible, be affiliated to the general hospital of the neighbouring town

This arrangement would be simple whenever a suitable general hospital willing to accept the responsibility existed, but where the C.O.H. (central orthopaedic hospital) was situated near a big city, a system of representation of all the principal general hospitals on the committee of management should be instituted. In any case, we would suggest that this committee should consist of:

- (a) Representatives of the general hospital or hospitals.
- (b) The orthopaedic surgeons and matron of the C.O.H.
- (c) The medical officers of health and tuberculosis officers of the district.
- (d) Representatives of the local authorities and education authorities of the district.

A large committee of this kind is needed to ensure the representation of all the interests concerned. It would appoint from among its members a smaller Executive Committee. It is by the possession of a truly representative local governing body that these hospitals can best be organized so as to carry out effectively their various activities in the clinical departments, the workshops, the schoolrooms and playrooms, and the out-patient clinics.

The affiliation between general and orthopaedic hospitals should not stop short at administrative affairs. Clinical co-operation is even more important. The spirit of mutual help rather than rivalry should run through all their relations. A great step towards ideal co-operation would be taken if the general hospitals would institute an orthopaedic section of their out-patient department and appoint one of the surgeons of the C.O.H. to take charge of it. Out-patients coming up could then be given provisional grouping, and later, after examination, be referred readily, for opinion or transfer, from the general to the orthopaedic side or vice versa.

Staff.

The staff may be considered as:

1. Orthopaedic surgeons. In most cases these would be visiting surgeons, and the salary would be on a part-time basis. In some places the appointment of a whole-time surgeon might be advisable.
2. Radiologist and physiotherapist.
3. House surgeons.
4. Matron.
5. Sisters, nurses, masseuses.
6. School teachers.

The appointments of the surgeons, radiologist, and matron should be made by the Ministerial Committee (see below) in consultation with the local committee. They should be held for a limited period, the occupant being eligible for re-election.

The house surgeons should be elected for periods of six or twelve months by the local committee on the recommendation of the surgeons.

In London and other big cities where orthopaedic hospitals or departments already exist it would be advisable merely to bring the existing institutions into the general organization so that co-ordination might be obtained. In this description of the C.O.H.'s and their management we are mainly concerned with those places where there is no satisfactory organization of this work.

(ii) A System of Scattered Out-patient Clinics.

As has been stated, these children require after-care or periodic supervision for long periods, sometimes for years, and the maintenance of this is fundamental to the success of the treatment. Often also appliances need repair or renewal. It has been found impracticable to bring all the patients more or less recently discharged up to one central hospital frequently for these purposes; scattered out-patient clinics are therefore a necessity.

A second and very great advantage in their existence is that they provide means for the preliminary examination of cases referred to them from local sources.

A third gain consists in the fact that it is possible to treat some of the minor cases as out-patients throughout. The clinics should probably number between twelve and twenty-four in each district, and as the use of the rooms would only be periodic, should be held in connexion with a local hospital, dispensary, or child welfare centre.

Wherever possible suitable local practitioners should be asked to help. One of the surgeons of the C.O.H. should visit the clinics periodically and see all the patients. He should also be prepared to examine cases sent to the clinics for consultation by local doctors and school inspectors. These facilities would become generally

known throughout each district, and this would mean that cases would be brought under treatment earlier, and that fewer would remain unknown and untreated.

A competent orthopaedic sister, selected from the staff of the C.O.H., should visit the clinics frequently, carry out treatment and exercise general supervision on the instructions of the surgeon.

C.—The Organization of Efficient Treatment.

The methods employed in dealing with these cases, and in particular the intimate knowledge of work with splints, appliances, and plaster-of-Paris, call for a specially trained surgical and nursing staff.

Further, in the demand for a very great deal of personal attention on the part of the surgeon lies one of the most convincing arguments for specialization. It is the special predilection for this work, and the patient attention to detail and after-care, which should distinguish the orthopaedic surgeon. Having withdrawn himself from active participation in the surgery of the head, the thorax, and the abdomen, he is able to specialize in the treatment of the disabilities of the joints, bones, muscles, ligaments, and nerves.

The central hospitals, where near a university town, would be available for the instruction of medical students, and the house-surgeon appointments would be of considerable educational value.

Nurses.

In addition the central hospitals would take their part in the training of nurses. And in this connexion there is a special advantage in definite affiliation with general hospitals, so that:

- (1) All nurses may get some experience of this work and
- (2) It may be possible for any nurse to specialize in orthopaedic work without having to extend her training excessively.

It is anticipated that under new regulations for the registration of nurses it will be necessary for every qualified nurse to be trained for three years in a general hospital. Therefore, unless the orthopaedic hospital is under the aegis of the general hospital, it would be necessary for the period of orthopaedic training to be entirely additional to the three years in the general hospital. Where, however, affiliation exists only about one extra year will have to be spent by those who want to take up orthopaedic nursing. At least six months in the plaster and splint department would be a necessary part of their training.

It will be essential to give good salaries and proper leisure so as to make the work attractive to the best type of nurse. In connexion with this side of the work we would recommend the appointment of a nursing tutor, who would carry out the clinical educational work and leave the matron free for her administrative duties.

Physical treatment will play a very important part in these hospitals. All working in this department should have passed the standard examinations in massage, electrotherapy, and remedial exercises.

D.—General Co-ordination by a Committee Working under the Ministry of Health.

This committee should consist of representatives of that authority, the British Orthopaedic Association, and the C.O.H.'s. The committee would appoint or advise as to the appointment of the staff of the C.O.H.'s, and would consider and make recommendations as to the general policy and methods of administration. It would be responsible for the attainment and maintenance of a high level of efficiency throughout the system.

For the primary organization a preliminary committee might well be appointed consisting of, say, three representatives of the Ministry of Health and three of the British Orthopaedic Association.

E.—The Number of Beds Required.

It is possible to get a fairly close estimate of the bed requirements by two methods.

(a) From the table already given it may be seen that the cases under treatment in Shropshire and at Stoke represent approximately 1 in 594 of the populations of the area "served." It is the opinion of those responsible for both

these organizations that less than half of the cases requiring treatment are so far reached, so we may take the proportion as 1 in 500 and be on the safe side. Almost all the patients require in-patient treatment for a time, and the relation of the average periods of in-patient and out-patient treatment is probably about 1 to 4. On these figures beds would be required for 1 in every 2,000 of population.

(b) In France before the war the establishment of beds for surgical tuberculosis was, we believe, based on the proportion of 1 to 8,000 population. This provision was found inadequate. Now the proportion of cases of surgical tuberculosis and other conditions in the total figures from Baschurch and Stoke is 230 to 1,130 or 1 in 5. Following these figures, 5 in 8,000 (or 1 in 1,600) would be the proportion to take in order to make a provision comparable to that of France.

By these two methods, which admittedly lead to approximate estimates only, we obtain the needs as 1 to 2,000 and 1 to 1,600 population. But as it is wiser to start with too few beds rather than too many, we would suggest the establishment as a commencement of 1 bed to 4,000 population, or, in round numbers, 10,000 beds in England and Wales.

F.—Finance.

(a) *The Establishment of the C.O.H.'s.*—We would recommend that these should be hatted hospitals. Probably a complete unit of 200 beds would cost £10,000. If this estimate proved correct the 10,000 beds would cost £500,000.

(b) *Upkeep.*—It is our opinion from the experience at Baschurch that £2 per bed per week would provide for the total expenditure of the C.O.H., including all salaries. For the 10,000 beds that would mean £1,040,000 per annum. For the out-patient clinics an attendance fee of 2s. 6d. or 3s. 6d. would probably meet all expenses. If we assume that there would be 40,000 out-patients (that is, four times the number of in-patients) and that the average attendance would be once a month, the annual cost at 3s. 6d. would be £84,000.

These statements are estimates of the total cost of the scheme, but are in no way to be considered as actual new expenditure. This must be far smaller owing to the following deductions. First, as regards establishment; hatted hospitals already exist in suitable places; they are at present used for war work, but will become available for transfer to the Ministry of Health; there are also orthopaedic hospitals already established which will be utilized in the organization. Secondly, under existing circumstances, many of the 10,000 patients who would occupy the beds have to be taken into general hospitals or workhouse infirmaries. These patients will come to the orthopaedic hospitals, but it will not mean new expenditure but a corresponding relief of the other hospitals. Similarly, cases belonging to the large class of surgical tuberculosis are now being maintained in various institutions under the provisions of the National Health Insurance Act; they will be transferred to the orthopaedic hospitals, but their maintenance fees will come with them. Further, the gathering together of all these cases into hospitals specially devoted to, and prepared for, their active and effective treatment will mean that the money expended on their care and treatment will be used more efficiently, and in many cases enable them to leave hospital more quickly and return to an active life. It will relieve the general hospitals of some of their most trying and chronic cases, and mean the setting free of beds to the relief of their waiting lists.

Such new expenditure as does prove necessary should not fall entirely on the Treasury.

Capital expenditure should be shared in suitable proportions with the local authorities. And with regard to running expenses there should be:

- (1) Private wards for those who could pay full fees.
- (2) Arrangements by which all patients should make a contributory payment who could afford to do so.
- (3) Arrangements by which local authorities should pay at least part of the cost of the poorer patients.

In this way the Treasury, the local authorities, and the patients would share the expenses. Possibly half the first cost and one-third of the running expenses would come from Treasury sources through the Ministry of Health. From the national point of view the improvement in the earning

capacity of the 40,000 or more children treated annually should go far toward covering the expenditure.

Finally, we would plead that the matter is very urgent. First, owing to the crying need; one cannot walk through the streets without seeing children and adults crippled for want of treatment.

Secondly, because the local authorities are now becoming alive to the condition of affairs, and are anxious for something to be done. A general organization is wanted for the efficient co-ordination of the work rather than any compulsion of local authorities. In both Shropshire and Staffordshire, where the authorities are already at work, there is general eagerness to join in the local organization.

Thirdly, a unique opportunity is presented now. The Ministry of Pensions is organizing orthopaedic hospitals and clinics, on similar lines to those described, for men crippled in the war; is providing them with the special departments, supplying the apparatus necessary, and is staffing them with surgeons trained in orthopaedic principles, many of whom have had much experience with crippled children.

These pensions hospitals will at first be fully occupied,

but before many months there will be a diminution in the needs of the soldier cripples. Then will come a time when they will have to be cut down, and their staffs gradually dispersed, unless the Ministry of Health has made its plans in advance and obtained the necessary financial provision for taking them over, either in part for children's work only, or as a whole with the responsibility of such war work as remains to be done. The opportunity is exceptional, and the advantages offered by it very great. But preparations should be made by the Ministry of Health immediately, so that it may be in a position to act when the time comes.

The matter is so urgent that Government action should not be awaited. Everywhere efforts should be made to start local organizations which would fit into the general scheme, but such action should be taken in consultation with the Ministry of Health.

We feel confident that, if an organization such as we have outlined is set up, many thousands of children otherwise doomed to the life of cripples will be redeemed to health, and others, though not fully cured, enabled to become self-supporting citizens, and given far greater possibilities of activity and happiness.

TRANQUIL TRACHEOTOMY, BY INJECTING COCAINE WITHIN THE WINDPIPE.*

BY

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As a general rule, the opening of the trachea is accompanied by so much disturbance that there often ensues a scene which the elder dramatists would have described as one of "wild excursions and alarms"! It is depicted in the following words by Clinton Wagner: "The introduction of the knife, together with the flow of blood, produces violent reflex action. The larynx rises and falls spasmodically and very rapidly, and the use of a knife or scissors is fraught with danger. The operator at this moment has need of all his coolness and presence of mind. Blood will find its way into the trachea and lungs, and death on the table from asphyxia may suddenly take place."¹

Apart from the risk of such a catastrophe, I remember the days when, before opening the trachea, one had to advise the audience to "take cover" behind the head of the operating table, as the cough started by the first entry of air into the windpipe frequently resulted in blood being shot out with such force that it bespattered the assistants, the walls, and even the ceiling.

All this commotion can easily be avoided by the intra-tracheal injection of cocaine in the way to be described. I acknowledge my indebtedness for the idea to Dr. Crosby Green, who, in an article on "Thyrotomy for cancer of the larynx," describes how, before splitting the larynx, he injected a 1 per cent. solution of cocaine through the crico-thyroid membrane into the cavity of the larynx.² He, it appears, is not in the habit of performing a preventive tracheotomy in this operation, and he makes no mention of injecting cocaine within the trachea. If not the first to use it in tracheotomy, I think I was the first to employ it in this country. This I did in the year 1913.

It is employed in the following way (see diagram): An ordinary hypodermic syringe is charged with about twenty drops of a 2½ per cent. solution of cocaine. As soon as ever the tracheal rings are laid bare the syringe is grasped,

as one does a pen, with the forefinger about one inch from the extremity of the needle, and with this the windpipe is sharply stabbed between two tracheal rings. The middle ring, and little fingers are resting on the neck, and they prevent the point from penetrating more than a quarter to half an inch within the lumen of the trachea. The cocaine solution is injected into the cavity of the windpipe, some five to fifteen drops, and the needle is sharply withdrawn.

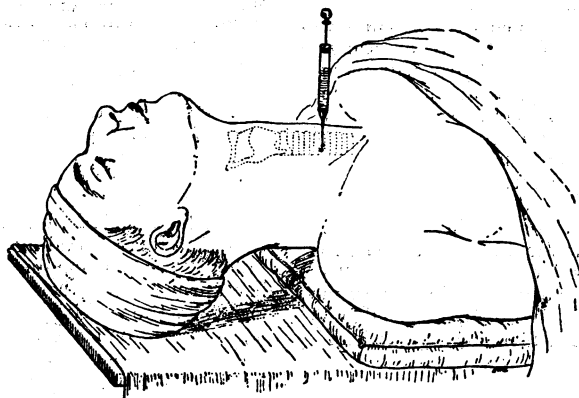
The liquid in the windpipe at once gives rise to a slight, stuffy cough. It causes no spasm or distress, and as it trickles down towards the region which endoscopists know to be the sensitive spot of this area—namely, the carina at the bifurcation of the trachea—this tickling cough soon ceases. If there is no great urgency, ten minutes should be allowed to elapse, the time being occupied by clearing the front of the trachea, checking all bleeding, preparing the tube, and so forth. At the end of that time the incision can be made into the trachea and the cannula introduced without pain, spasm, or even the slightest cough, as quietly and smoothly as the original incision through the skin. The calm with which this proceeding takes place is in striking contrast with the agitated, hurried, and often bloody and dangerous operation of former days.

I have used cocaine of the strength of 2½ per cent. for the simple reason that a 5 per cent. solution is generally at hand, and it has been convenient to dilute it one half. I find the 2½ per cent. strength quite as effective as the 5 per cent., which

I tried first. In children a 1 per cent. solution and five drops would be sufficient.

The method is employed with either general or local anaesthesia. Local anaesthesia is sufficient in all adults when the opening of the trachea is the only operation to be performed at one sitting.³ With novocaine used endermically, and the cocaine used in this way within the windpipe, there is neither pain, spasm, nor coughing in performing tracheotomy. A patient gets up from the table and walks back to his ward, to eat his usual meal.

I have records of 25 cases of laryngo-fissure in which this method has been used in performing the preliminary tracheotomy, and the numerous visitors to my practice have been able to see the calm which it secures. In these five years it has been used in scores of cases of tracheotomy by myself, Mr. Hope, Dr. McIlraith, and the housemen in King's College Hospital, with uniformly good results and with no drawbacks.



Semi-diagrammatic illustration showing the injection of cocaine within the lumen of the trachea, as a preliminary to tracheotomy. It also shows the best position of the shoulders and head for tracheotomy, laryngo-fissure, and other external operations on the larynx and trachea.

* A paper read before the American Medical Association (Section of Oto-Laryngology), Atlantic City, N.J., on June 13th, 1919